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DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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November 24, 2003

TO: Minerals File

FROM: Paul Baker, Senior Reclamation Biologist

RE: Site Inspection, Kennecott Utah Copper, Bingham Canyon Pit, M/035/002, Salt Lake County, Utah

Date of Inspection: October 24, 2003
Time of Inspection: About 11:00 a.m. to 2:00 p.m.
Participants: Vickie Peacey, Kennecott; Paul Baker, DOGM

Purpose of Inspection:

I wanted to look more closely at vegetation on some of the tailings ponds and to see results of some of the revegetation work done the past few years on the waste rock dumps.

Observations:

Tailings Ponds

We looked at several areas on the tailings ponds. These different areas have varying pH and electrical conductivity values depending on the tailings that ended up going on the surface and on how long they have been there. The time the tailings have had to dry varies across the area, but in general, the areas on the east are the least dry. Some areas on the west have been reclaimed for at least a few years.

We walked through one of the older reclaimed areas on the west. This area had a lot of tamarisk, but there was quite a lot of what I believe to be tall fescue in the understory.

The seed mix the operator is using contains several perennial species in combination with cereal rye and barley. The purpose of the rye and barley is to obtain vegetative cover very quickly for dust control. In a report for a recent site visit, I commented about revegetation on one area of the tailings pond and said the only plants I could find were barley, rye, and various weeds. Looking more closely during the current visit, I was able to see

numerous grass and fourwing saltbush and a few shadscale seedlings. Although the grasses did not have seed heads, they appeared to be wheatgrasses, such as tall wheatgrass. As we looked at additional areas, there were some places with little besides rye and barley, and there were others where rye and barley were not doing so well but where the perennials were progressing well. The seed mix includes several native species that I believe are adapted to the area but which have not, as far as we could see, become established in the reclaimed areas.

Midas Dump and Galena Gulch

We looked at reclaimed areas in the Midas dump area near the Bingham Canyon Pit. Some of these areas were reclaimed last year, but some have been reclaimed for several years. Some of the dump areas that were reclaimed last year only had about three feet of waste over soil, so some of the soil was brought to the surface when these areas were ripped. Looking at these areas from a distance, it is difficult to tell that there is any vegetation, and they do not appear green. Looking at them more closely, one can see a lot of small grasses, such as sheep fescue or something similar, and some other species, including yarrow and big sage. Although this area will not provide much vegetation cover or forage for wildlife for the foreseeable future, I consider the revegetation to be fairly successful considering the difficult environment. I do not believe, though, that it has more than 70 percent of the cover of adjacent undisturbed areas.

In one flat area, several Austrian pine seedlings were planted a few years ago together with seedlings of other species. The only other species I remember is Gambel oak. I looked at this area two years ago, and although the Austrian pines have not grown much, they are still alive and appear healthy. The oak seedlings I saw were just barely surviving; they did not appear to be thriving.

In this same area, we looked at sagebrush that was transplanted last year. Different types of seedlings were used, and according to Ms. Peacey, the most successful were those that came in "Booth tubes" from a nursery in Montana. They were the least expensive and had the best survival. I was impressed with the amount of growth all of the seedlings had had in just one year and also with the survival and amount of cover they were providing. I am not aware of the soil conditions in the area, but I definitely felt transplanting had been very successful.

To the east of the area where the Austrian pines were planted is a larger, relatively flat area where some vegetation has been established for a few years. While there are several desirable species in this area, there is also a lot of cheatgrass and either yellow or Dalmatian toadflax. Toadflax is a very competitive species that the Department of Agriculture and Food has considered placing on the state noxious weed list. One or two years ago, the Division supplied the operator with information about insects as a biological control on this species, but I do not know if insects were introduced.

We also went to Galena Gulch which was reclaimed in 2002. The area was seeded, and seedlings of Engelmann spruce were planted. I do not know what percentage of the seedlings survived, but we were able to find several. They were slightly chlorotic, and next spring, it should be easier to tell if they will survive.

Conclusions and Recommendations:

The tailings pond seed mix includes alkaligrass, Nuttal alkaligrass, inland saltgrass, alkali sacaton, and sand dropseed. Although I feel these species are adapted to the site, it is difficult to get them to become established. The operator may want to delete them from this seed mix. There are other species in the mix, including Russian wild rye, rubber rabbitbrush, and yellow sweetclover, that we did not see, but I suggest that the operator keep these species in the mix.

I suggest the operator introduce insects as a biological control for toadflax if this has not already been done. To find what insects to use, the operator should contact Dawn Holzer with the Utah State University Extension Service in Logan.

There is a relatively new herbicide, Plateau, that has proven very effective for controlling cheatgrass while inflicting minimal damage on perennial species. This may be a good option for the area where cheatgrass has become established. I will supply information about the herbicide to the operator. Plateau is also registered for control of Dalmatian toadflax

In addition to the recommendations mentioned above, it is important that the operator do whatever possible to grade waste dump slopes as soon as possible. Exposing this rock to the atmosphere helps to reduce problems with acidity and salts that have been the bane of revegetation efforts at this mine.

jb
cc: Vickie Peacey, Kennecott
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